## THE VARLEY TESTIMONIAL.

AN important Committee, containing among others, Lord Kelvin, Prof. Ayrton, Prof. G. Forbes, Dr. Gladstone, Prof. D. E. Hughes, Dr. J. Hopkinson, Prof. Kennedy, Prof. O. Lodge, Prof. J. Perry, Messrs. W. H. Preece, A. Siemens, A. Stroh, J. W. Swan, and Prof. S. Thompson, has been formed, to give effect to the feeling amongst some of the older members of the electrical profession that the life-long labours in electrical research of Mr. S. A. Varley should be recognised by some substantial testimonial befitting his reputation as a scientific investigator.

A brief sketch of Mr. Varley's career will serve to show what signal services he has rendered to the cause of electrical science and the honour his discoveries have conferred upon this country.

Mr. Samuel Alfred Varley was born in London in 1832, and was the third son of the late Mr. Cornelius Varley, an active man of science and an artist. In 1858, when the Atlantic cable was being constructed, he wrote a paper, read before the Institute of Civil Engineers, "On the Electrical Qualifications requisite in Long Submarine Cables," and was shortly afterwards elected an Associate Member of that Institution.

In the paper referred to above, Mr. Varley opposed the views of the electrical advisers of the company. Faraday, who had publicly supported their opinions, endorsed Mr. Varley's ideas immediately after receiving a copy of his paper. Mr. Varley followed this up by reading a second one before the Society of Arts in 1859, "On the Practical Bearing of the Theory of Electricity to Long Submarine Telegraphy." In this paper he suggested, among other things, the use of artificial lines, which have since proved of such value in connection with duplex working. In 1866 Mr. Varley discovered for himself the re-action or self-exciting principle, and at that early date constructed his first machine of the pure dynamo type, which is now in the Museum at South Kensington. His dynamo of 1866 was exhibited at the Inventions Exhibition of 1885, and for this he was awarded a gold medal.

The controversy which subsequently arose on this invention may be held to have been fitly summed up by the late Robert Sabine, C.E. (son-in-law of Sir Charles Wheatstone), in the following words:—"Professor Wheatstone says he was the first to complete and try the reaction machine. Mr. S. A. Varley was the first to put the machine officially on record in a provisional specification, dated December 24, 1866, which was, therefore, not published until July, 1867. Dr. Werner Siemens was the first to call public attention to the machine in a paper read before the Berlin Academy on the 17th January, 1867." (See *Engineering*, November, 1877.)

In 1866 he introduced needle-telegraph coils, in which soft-iron magnetically-induced needles were substituted for tempered steel needles. These induced and consequently undemagnetisable needles entirely superseded the old form introduced by Wheatstone and Cooke, and were largely adopted by the Postal Department. In the same year (1866) he designed a system of electric train inter-communication.

In the year 1875 Mr. Varley became assistant-manager of the works of the late British Telegraph Manufactory, Limited, and as the first Gramme machines constructed in England were manufactured by this firm, he had ample opportunities of studying the characteristics of both series wound machines and those having a seperate armature for excitation of the field magnets. There is scarcely a doubt that Mr. Varley's investigations at this period led to the invention of compound winding, for in 1876 he patented a series-shunt or compound-wound dynamo, and, in three legal suits, the claim that this specification first described a system of compound winding has been fully sustained. Mr. Varley has from time to time contributed papers read at the meetings of the British Association, among which may be mentioned one "On the Mode of Action of Lightning on Telegraph Circuits," wherein he described a lightning bridge designed by himself, a number of which are now doing duty, although fitted up more than twenty years ago.

But Mr. Varley's *magnum opus* is the important part which he took in the invention and perfecting of the dynamo, perhaps the most striking invention of the century, and upon this his fame as a patient, conscientious, and earnest scientific investigator of the Faraday school will permanently rest. His researches were undertaken in the true spirit of science, and no thought of self-emolument has ever caused him to deviate from the path which he has pursued throughout an eventful, although eminently simple and blameless life, a life in which self-denial and self-sacrifice have had no small share. Like many men of genius he was far ahead of the times, and has lived to see others reap the benefit of his great discoveries. His nervous and retiring disposition has for years kept him from the busy haunts of men, and to the younger generation of electricians he exists only in name, a name, however, that will live as long as the dynamo is employed in the service of man.

Subscriptions will be gladly received by the hon. treasurer, Mr. Stroh, 8 Haverstock Hill.

## NOTES.

THE *Electrician* for August 5 contains an article on Lord Rayleigh, which is accompanied by a steel portrait.

AT a recent meeting of the Berlin Geographical Society, the chairman, Baron von Richthofen, announced that the society was about to publish, in commemoration of the 400th anniversary of the discovery of America, a work descriptive of the ancient manuscripts and maps in the Italian libraries relating to the history of this event. The German Emperor has promised a contribution of 15,000 marks towards the expense of the undertaking, and it is to be edited by Dr. Kretschmer. The accompanying atlas will contain thirty-five large maps, of which thirty-one are new, and will be published for the first time.

AT the lunch in the Library Hall, St. Andrews, on the 11th, to the party from the British Association, Prof. McIntosh announced that Mr. Charles Henry Gatty, of East Grinstead, had presented £1,000 for the purpose of establishing a Marine Laboratory at St. Andrews, which sum he further increased to £2,000 before the close of the day. The name of Mr. Gatty is sufficiently familiar to marine zoologists, were it only in connection with the accomplished lady (Mrs. Alfred Gatty), the favourite correspondent of Dr. George Johnston, of Berwick-on-Tweed. Mr. Gatty's munificent donation will enable St. Andrews to have a substantial and comfortable laboratory instead of the wooden building (formerly a fever hospital), which has hitherto been used for marine work since the period of the Trawling Commission under Lord Dalhousie. St. Andrews Marine Laboratory is the oldest permanent station in the country, and, as it has pre-eminent advantages in regard to varied and very rich marine fauna and flora, easy access to a fine University Library, and a University Museum—unique in certain departments, a new future is opened to it through Mr. Gatty's handsome gift. At the same meeting it was stated that the Fisheries prize of £20 given annually to the best student of Zoology (hitherto from an anonymous donor) was the gift of Mr. J. W. Woodall, of Scarborough. Both Mr. Gatty and Mr. Woodall were present.

DURING the past week the weather has been fine generally over the southern portion of the kingdom, but somewhat unsettled. The anticyclonic conditions which prevailed for a day or two in the middle of last week gave place on Friday, the 12th inst., to a south-westerly current, with showery weather, the rainfall being rather heavy in the north and west, while the low pressure over the north of Scotland caused rather strong gales and heavy seas on Saturday and Sunday. During the early part of the present week a depression advanced from the southward, occasioning unsettled weather and fog or mist in places, while exceptionally heavy rains occurred in parts of Ireland and Scotland, the amount measured at Parsonstown on Monday morning being 1·24 inches. During the week the maximum temperatures have nearly reached 80° in some parts of England and in the east of Scotland. For the week ending the 13th inst., temperature was below the mean in all districts, except the Channel Islands, where it just equalled it. The absolute minima, which were registered on the 11th, were exceedingly low for the time of year, and at many of the more inland stations frost was experienced on the grass.

THE fifth annual report of the National Association for the Promotion of Technical and Secondary Education has just been published, and satisfactory progress is shown. During the year a bi-monthly journal has been issued under the title of the *Record of Technical and Secondary Education*, in which detailed accounts of the work done by the County Councils have been given from time to time. The *Record* has to some extent relieved the pressure on the space of the report, which is shorter than its predecessors.

THE *Ceylon Observer* for July 21 has an editorial on "Marine Biological Stations," and while sympathizing with the decision of the meeting which was called together a short time ago to take steps to establish a station in the island of Jamaica, ventures the hope that Ceylon, too, may have its marine biological station, and points out how particularly well situated that island is for such an undertaking.

WE refer elsewhere to Prof. Forel's report on the present extension of the Alpine glaciers, to which, whatever the *modus operandi*, the disaster of St. Gervais was due. A letter in Tuesday's *Times* refers to Mr. Douglas Freshfield's warning that there may still be an excess of water ready to discharge itself in the neighbourhood of the Aiguille du Gouté, and states that the view has received a remarkable confirmation. While a party was breakfasting at the Pierre Pointue, which overhangs the stream that drains the eastern wing of the Glacier des Boisons, a tremendous noise suddenly brought them all—visitors and *employés* of the chalet—out upon the platform to see the violent flood of opaque brown fluid which tore down the bed of the stream which had been flowing so quietly before. No great damage seems to have been done, but certainly the occurrence will strengthen the view that careful scientific studies should be made so that complete warning may in all cases be given.

AN address on "Geological Chronology," which Prof. Young delivered to the Physical Society of Glasgow University in February last, has been published in pamphlet form by Messrs. Carter and Pratt, Glasgow.

A PRELIMINARY draft prospectus of a new physical atlas, which Messrs. J. Bartholomew and Co., Edinburgh, have in preparation, has reached us. The work will be based upon Berghaus's "Physikalischer Atlas," published by Justus Perthes, of Gotha, 1889–92, but will, we understand, be much larger and more extensive, and contain a great deal of entirely new and original matter. According to the present intentions of the compilers, the work will be issued in five separate sections as follows: (1) Geology; (2) Orography and Hydrography; (3) Meteorology and Magnetism; (4) Botany and Zoology; (5) Ethnography and Geographical Demography, and when complete may be obtained either in one complete volume, or in five smaller volumes. The joint authors will be Mr. J. G. Bartholomew and Dr. H. R. Mill, and the various sections will be revised and edited by, amongst others, Prof. Bayley Balfour, Dr. A. Buchan, Sir Archibald Geikie, Prof. James Geikie, and Dr. John Murray.

THE *Times* of Tuesday states that Lieutenant Bower has discovered in Chinese Turkestan the remains of a subterranean city, in one of the excavations near which he found a curious birch-bark manuscript, which he took with him back to India for the investigation of scholars. The manuscript is described as having been dug out of the foot of one of the curious old erections just outside a subterranean city near Kuchar. These erections are said to be about 50 feet to 60 feet high, in shape like a huge cottage loaf, built solid with sun-dried bricks, with layers of beams now crumbling away. Dr. Hoernle, who undertook the examination of the manuscript, thinks that these erections are Buddhist stupas, which often contain a chamber enclosing relics and other objects. These chambers are generally near the level of the ground, and are often excavated by persons in search of hidden treasure. There is no reason why a birch-bark manuscript, thus preserved from the chances of injury, should not last for an almost indefinite period, especially if the chamber is air-tight. Dr. Hoernle has now communicated to the Asiatic Society of Bengal the result of his examination of the manuscript. It is written in Sanscrit of a very archaic type, not in the Sarada character of Cashmere, as was at first surmised, but in the Gupta character, which is a much earlier form. Separate portions of it were written by different scribes and at different dates, and the latest portion must, he thinks, be ascribed to a period not later than the second half of the fifth century—say 475 A.D.—while the earlier portion must be referred to a date half a century earlier. The manuscript is therefore the oldest Indian manuscript, and one of the oldest manuscripts existing in the world. The manuscript consists of fifty-five leaves, all of which have now been transcribed and the greater part translated by Dr. Hoernle, and both will be published in instalments by the Asiatic Society of Bengal.

THE *Times* India correspondent gives us some important intelligence regarding Mr. Conway's exploring party in the Hindu-Kush. The party has arrived at Askoleya after making the first definitely recorded passage of the Hispar Pass—the longest glacier pass in the world. The party left Nagar on June 27, spent ten days exploring the vast system of glaciers not marked on any map which covers the north slopes of the main Hindu-Kush range in that neighbourhood. Mr. Conway ascended a difficult rock peak of 17,000 feet, and attempted the ascent of the Great Nagar Mountain, but he was driven back by a hundred yards of ice fall, that proved to be absolutely impassable. On July 11, after a day's halt at Hispar, Mr. Conway started up the great glacier and reached the foot of Nushik in three short marches. The next day being cloudy he did not go to the top of Nushik, as he had intended, but he sent a party under Mr. Rondebush to cross that pass. They took all the spare baggage and conveyed it by the Braldo Valley to Askoleya. Meanwhile Mr. Conway and Mr. M'Cormick with an Alpine guide, Zurbuggen, continued three more marches up the great Hispar glacier to the pass, which they actually crossed on July 18. The view from the pass is said to be superb, over a vast lake of snow some 300 miles in area, quite flat, surrounded by a ring of giant peaks and with a row of peaks rising like islands in the midst of it. They camped just below the pass on the east side and were overtaken by a severe snowstorm. They descended two marches down the Biafo glacier to the level of grass, whence they sent Zurbuggen to Askoleya, which he reached in one long day's march. Mr. Conway spent six days on the way, chiefly occupied in surveying, which the continued bad weather rendered difficult. The whole party re-united at Askoleya on July 26. The length of the pass from the foot of the Hispar Pass to the foot of the Biafo glacier is about ninety miles. The mercury on the pass stood at 15·85 in. No one suffered perceptibly from the rarefaction of the air.

The latest news from Etna is that Monte Gemmellaro has broken out afresh, and the great lava current that has been flowing from it has now been divided into two arms, both of which are rapidly advancing in the direction of Serra Pizzuto and Pedova, completely covering *en route* the lavas of 1886. The deluges of molten rock that have been emitted during the last month have destroyed one of the finest and most fertile districts in Sicily.

Prof. Forel has recently prepared a table (*Arch. de Sci.* July 15) showing the behaviour of the small lake at the Great St. Bernard in regard to cold since 1817. This lake is at a height of about 8000 feet, is about 24 acres in surface, and of small depth. It appears the mean duration of the frozen state is about 268 days; for nearly two-thirds of the year the lake is imprisoned "under a carapace of ice and snow." This justifies only too well the remark of the monk, "Nine months of winter and three months of bad weather." Between the earliest date of freezing (September 30) and the latest (November 6) are 36 days, the mean date being October 20. The earliest date of thawing is June 12, and the latest September 15; difference 95 days (the mean date being July 13). By grouping the dates in a series of decades (approximately) Prof. Forel finds maxima of duration of the frozen state in 1840-49 and in 1880-91, and a minimum in 1860-69. This corresponds fairly, he points out, with the phases of Brückner's cycle, according to which a maximum of cold occurred about 1850, a maximum of heat about 1860, and a maximum of cold about 1880.

By the election of the present holder—Mr. A. A. Kanthack—to the Medical Tutorship of the Liverpool University College Medical School, the John Lucas Walker Studentship in Pathology at Cambridge will shortly become vacant. The studentship is of the annual value of £250, and is tenable for three years. Candidates should send in their applications and testimonials by October 25, to Prof. Roy, F.R.S., New Museum, Cambridge.

We learn from the *British Medical Journal* that the Library of the British Medical Association has been presented with a valuable gift of a series of important works, bearing chiefly on hygiene and public medicine, from the library of the late Dr. Alfred Carpenter. The books number upwards of 250 volumes, and are the gift of Mrs. Carpenter.

An interesting account of a visit by Mr. E. Satow to the ruins of Sukkhothai and Sawankhalôk, Siam, appears in the Journal of the Society of Arts, for August 12.

A new edition—the sixth—of "The Electric Light popularly explained," by A. Bromley Holmes, has just been brought out by Messrs. Bemrose and Sons, Limited.

"Papers and Proceedings of the Royal Society of Tasmania for 1891" has just reached us, and we learn from the report that during the year six meetings were held and thirteen papers were read; the income amounted to £393, and the expenditure to £235 1*s.* 1*d.*

A Catalogue of Standard English and Foreign Books on Chemistry and the Allied Sciences has just been issued by Mr. W. F. Clay, Edinburgh.

The Annual Report of the Superintendent, Mr. J. H. Hart, on the Royal Botanic Gardens, Trinidad, for 1891, has lately been published, and much good work seems to have been accomplished during the year.

We have received from the Australian Museum, Sydney, Parts I. (Cephalopoda) and II. (Pteropoda) of the Catalogue of the Marine Shells of Australia and Tasmania, which Mr. John Brazier is compiling.

A pamphlet on "The Dairy and its Equipment, with Practical Management of Milk and Cream," which has been written by Dr. H. J. Webb (the Principal of the Aspatria Agricultural College) in conjunction with Mrs. Edward Moul, and recently issued, is full of information likely to be of use to those engaged in dairy-work.

In the *American Naturalist* for August, Dr. S. Lockwood gives a geological reason "Why the Mocking Birds Left New Jersey," and the report of Prof. Osborn's lectures on "Heredity and the Germ-Cells" is continued.

*Naturae Novitates* for July has reached us from the publishers, R. Friedländer & Sohn, Berlin.

Three new volumes have been added to the excellent series entitled "Encyclopédie Scientifique des Aide-Mémoire" (Gauthier-Villars)—"Notions de Chimie Agricole," by J. Schlœsing, Fils; "Les Divers Types de Moteurs à Vapeur," by E. Sauvage; "La Bière," by L. Lindet.

The additions to the Zoological Society's Gardens during the past week include a Macaque Monkey (*Macacus cynomolgus*) from India, presented by Mr. H. D. Bowditch; a Puma (*Felis concolor*), a Tayra (*Galictis barbara*) from Brazil, presented by Mr. J. E. Wolfe; three Martineta Tinamous (*Colodromus elegans*) from Bahia Blanca, Argentina, presented by Mr. F. W. Horn; a Slender-billed Cockatoo (*Licmetis tenuirostris*) from Australia, presented by Dr. J. G. Victor Sapp; a Californian Sea Lion (*Otaria stelleri*) from the North Pacific, an Indian Chevrotain (*Tragulus meminna*, ♀) from India, deposited; an Indian Oriole (*Oriolus kundoo*), two —— Himalayan Tree Pies (*Dendrocitta himalayensis*) from India, five Black-necked Tanagers (*Euphonia nigricollis*), six Thick-billed Tanagers (*Euphonia laniirostris*), a Violet Tanager (*Euphonia violacea*), a Greenish Tanager (*Euphonia chlorotica*), a Lead-coloured Tanager (*Hypophœa chalybea*) from Brazil, purchased; a Magellanic Goose (*Bernicla magellanica*) bred in Holland, six Himalayan Tree Pies (*Dendrocitta himalayensis*) from India, received in exchange.

## OUR ASTRONOMICAL COLUMN.

The Perseids.—Mr. Denning, in the August number of *The Observatory*, remarks, with reference to the radiant point of the Perseids, that "the agreement of observation and theory is not perfect, especially as regards the shower at its earlier stages and at its termination, when the displacement appears to be somewhat greater than theory requires." From observations made on August 16, 1877, the radiant he deduced was 60° + 59°, the theoretical position, according to Dr. Kleiber, being 54° + 59°. In 1886, on the same date, from the path of a very bright Perseid, Mr. Denning obtained a radiant point of 53° + 59°, a value closely approaching the theoretical one. As Mr. Denning has reason to believe that the Perseids will continue to fall until the 22nd of this month, and as the suspected radiant for this date is about 77° + 56½°, our readers will have an opportunity of either verifying this position or obtaining one more accurate.

The observations of the August meteors seem to have been sadly interfered with by the weather. So far we have received no communication respecting them.

"Himmel und Erde."—The August number of *Himmel und Erde* contains much that will be read with interest. Herr J. Plassmann contributes an article, which will be continued in the next issue, on variable and new stars, in which, after referring to the peculiar features of the late nova, he discusses the light curves of many well-known variables. A supplement to the note on the great February spot includes an illustration